

California Environmental Protection Agency



DRAFT

Vapor Recovery Test Procedure

DRAFT TP - 20X.XX

**DETERMINATION OF LIQUID RETENTION
IN GASOLINE NOZZLES**

Adopted:

**California Environmental Protection Agency
Air Resources Board**

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1 APPLICABILITY

This vapor recovery test procedure can be used to determine the amount of liquid retained in the nozzle spout and available for evaporation into the atmosphere. The retained liquid will evaporate to the atmosphere either while in the nozzle spout or as spillage just prior to the next refueling. Liquid in the nozzle that is blocked to the atmosphere due to internal valve(s) will not be included. Liquid in the vapor path of the nozzle and also available for evaporation will also be collected.

2 PRINCIPLE AND SUMMARY OF TEST PROCEDURE

The sample is poured into a graduated cylinder appropriate to the size of the spout and vapor recovery path. Recovered liquid is volumetrically measured, recorded, and transferred to an appropriate storage container. Where liquid was recovered, additional work is required to determine if the liquid was the result of a customer top off or a faulty nozzle.

3 DEFINITIONS

Definitions common to all certification and test procedures are in ARB vapor recovery test method:

**D-200: Definitions for Certification Procedures and Test Procedures for
Vapor Recovery Systems**

For the purpose of this procedure, the term "ARB" refers to the State of California Air Resources Board, and the term "ARB Executive Officer" refers to the Executive Officer of the ARB or his or her authorized representative or designate.

4 BIASES AND INTERFERENCES

- 4.1** Compressing the vapor recovery nozzle boot can release liquid that would not evaporate, but would be returned to the underground storage tank or delivered during a subsequent fueling. The measurement shall be null and void if the nozzle vapor recovery boot is compressed while collecting liquid for this test procedure.

5 SAFETY

Gasoline is a flammable liquid. Gasoline and other petroleum products are known to the State of California to contain hazardous chemicals, such as benzene, that can cause immediate (acute) and delayed (chronic) injury, including cancer. Gasoline as a liquid, vapor, fume, or spray mist can be injurious to eyes, skin, nervous system, and lungs. This method should be performed by people who have been trained in respiratory protection and working with flammable chemicals.

Ground test equipment prior to contact with vapors, dispensing gasoline, or returning gasoline to the storage tank.

Testers at gasoline dispensing facilities should remain alert for traffic hazards. Traffic cones are recommended around perimeters of the work area.

6 SENSITIVITY, RANGE, AND PRECISION

6.1 Sensitivity

This test procedure is sensitive to the nearest milliliter for graduated cylinders up to 100 ml and sensitive to the nearest 10 ml for graduated cylinders up to 1000 ml.

6.2 Range

The lower end of the range using specified equipment (Section 7 of this test procedure) is 1 ml (10 per cent of a 10 ml graduated cylinder). The upper end of the range is 900 ml (90 percent of a 1000 ml graduated cylinder). There is nothing in the test procedure to prevent extending the range by using graduated cylinders not specified in this test procedure.

6.3 Precision

(This section is reserved for future specification.)

7 EQUIPMENT

(Use of trade or manufacturer's names are not a recommendation nor endorsement by the ARB. The use of such names are examples of equipment that should meet or exceed the required specifications.)

(Plastics can develop a static electric charge from gasoline. These plastics may be non-conductive so grounding is not an option. Use caution in the material makeup of selected test equipment for this method.)

7.1 Graduated Cylinders

7.1.1 For Balance Nozzles:

- a) Internal diameter shall be 2 inches or larger.
- b) Recommended measurable volume is 500 or 1000 ml. at 10 ml. increments or less.

7.1.2 For Mini-booted Vacuum Assist Nozzles (no vapor recovery holes in the spout):

- a) Internal diameter shall be 1 ½ inches or larger.
- b) Recommended measurable volume is 500 ml. at 10 ml. increments or less.

7.1.3 For Bootless Vacuum Assist (with vapor recovery holes in spout):

- a) Internal diameter shall be 1 inch or larger.
- b) Recommended measurable volume is 100 ml. at 1 ml. increments or less.

7.1.4 100 ml. graduated cylinder in 1 ml. increments.

- a) For accurate measurement of liquid catch between 10 and 100 ml.
- b) May be the same graduated cylinder as specified in Section 7.1.3.

7.1.5 25 ml. graduated cylinder in 1 ml. increments.

For accurate measurement of liquid catch between 5 and 25 ml.

7.1.6 10 ml. graduated cylinder in 1 ml. increments.

For accurate measurement of liquid catch between 1 and 10 ml.

7.2 Funnel (optional)

For this test procedure a funnel may be used to assist in the transfer of gasoline from one container to another. The funnel may be used in lieu of the larger graduated cylinders specified in Sections 7.1.1 and 7.1.2 if the smaller cylinder has sufficient capacity for all the liquid retained by the nozzle.

- a) The upper funnel portion (where liquid is received) shall be 3 inches or larger in internal diameter and 3 inches (3 ½ inches for mini-booted nozzles) long.
- b) The lower portion (where liquid is dispensed) shall be ¾ inches or smaller in external diameter and 1 inch or longer. If tapered, the bottom portion may be wider than ¾ inches, but the last inch or more shall be ¾ inch ID or less.

Caution: When used with graduated cylinders, the funnel may make the cylinders less stable and prone to accidental spillage.

7.3 Catch Basin

Bucket or similar container 12 inches or larger in diameter at the open end and 5 quarts or larger capacity appropriate for catching and holding gasoline.

7.4 Portable Gasoline Container

Use a closable container suitable for the storing gasoline.

8 CALIBRATION PROCEDURE

Measurement and recording devices shall be calibrated in accordance with methods and intervals described in “ARB Air Monitoring Quality Assurance Manual, Vol.VI, Standard Operating Procedures for Stationary Source Emission Monitoring and Testing” or “US EPA Quality Assurance Handbook for Air Pollution Measurement Systems.” Appropriate calibration procedures in accordance with California Department of Food and Agriculture, Division of measurement Standards and County Division of Weights and Measures are also acceptable.

See Section 15 of this procedure for using alternate methods, subject to approval by the ARB Executive Officer.

9 PRE-TEST PROTOCOL

(This section heading is not applicable to this procedure.)

(This section is reserved for future specification.)

10 TEST PROCEDURE

Place a catch basin (bucket) on the ground (same level as vehicle wheels when the vehicle is refueling at the same nozzle).

Also, place the catch basin within easy reach of the dispenser and nozzle hose. (The graduated cylinder is to be over and later inside the catch basin as liquid is drained from the nozzle.)

Record the time on the data sheet. (See Figure 1 for an example of a suggested data sheet.)

Record the dispenser number and, if more than one nozzle, the nozzle grade.

Remove the nozzle from its dispenser holder. Keep the nozzle at the same level as or higher than the dispenser holder and keep the nozzle spout pointing up. DO NOT INITIATE THE DISPENSER.

Place the appropriate graduated over the nozzle. (100 ml or larger for “bootless” nozzles, and 500 ml or larger for “booted,” including “mini-booted,” nozzles.)

Make sure the metal nozzle spout is in contact with the graduated cylinder.

Also, make sure the vapor holes for bootless nozzles are within the graduated cylinder. Or, for booted and mini-booted nozzles, the graduated cylinder is against the face of the boot.

With the graduated cylinder over the spout, move the nozzle over the catch basin.

Then begin lowering the nozzle into the catch basin with the graduated cylinder still covering the spout.

While lowering the nozzle, rotate the nozzle so the spout is pointing down, collecting any and all liquid in the spout and vapor path in the graduated cylinder.

Any liquid not caught or retained by the graduated cylinder shall be caught and retained by the catch basin.

When all liquid has drained from the nozzle and vapor holes or boots, place the nozzle back in its dispenser holder.

Transfer any liquid collected by the catch basin back to the graduated cylinder.

Transfer the liquid catch to the graduated cylinder appropriate for measuring the volume to the nearest milliliter.

For liquid catches between 1 and 10 ml. use the 10 ml. graduated cylinder.

For liquid catches between 5 and 25 ml. use the 25 ml. graduated cylinder.

For liquid catches between 10 and 100 ml. use the 100 ml. graduated cylinder.

For liquid catches over 100 ml. use the 100 ml. graduated cylinder repeatedly and/or in combination with the other graduated cylinders until liquid catch has been fully and accurately measured.

If there is no liquid catch:

Record zero on the data sheet.

And move on to the next nozzle repeating Section 10 of this test procedure at each nozzle.

If there is a liquid catch:

Record the correct measured volume on the data sheet.

Also record the nozzle make, model number, and serial number on the data sheet.

Transfer the liquid to a safe container. (Dispose or recycle collected gasoline as appropriate.)

Then move on to the next nozzle repeating Section 10 of this test procedure at each nozzle.

Return to nozzles with liquid catches after the other nozzles in the facility have been tested.

Record the time and repeat Sections 10 of this test procedure at each nozzle where liquid had been collected.

If there is no liquid catch this round:

Record zero on the data sheet.

And move on to the next nozzle that had a liquid catch repeating Section 10 of this test procedure at each nozzle.

If there is a liquid catch:

Record the correct measured volume on the data sheet.

Transfer the liquid to a safe container. (Dispose or recycle collected gasoline as appropriate.)

Bag, stand by, lock down, or otherwise secure the nozzle so it cannot be used over a duration of time at least equivalent to the time between the previous two liquid measurements and no longer than 36 hours.

Then repeat Sections 10 of this test procedure.

If there is no liquid catch during the third round:

Record zero on the data sheet.

And move on.

If there is a liquid catch for the third round:

The nozzle is malfunctioning.

Record the correct measured volume on the data sheet.

Take action as appropriate to ARB or District Rules and Regulations,

Executive Orders, and/or appropriate permit conditions.
Transfer the liquid to a safe container. (Dispose or recycle collected gasoline as appropriate.)

11 QUALITY ASSURANCE / QUALITY CONTROL (QA/QC)

Calibrate equipment in accordance with Section 8 of this test procedure.

12 RECORDING DATA

Record the following data. See Figure 1 for an example of a Field Data Sheet.

- 12.1 Gas Station name, address, and contact.
- 12.2 Testing Firm name, address, phone number and tester's name(s).
- 12.3 Applicable ARB Executive Order Number(s).
- 12.4 Test date and times.
- 12.5 Dispenser (pump) number.
- 12.6 Gas grade.
- 12.7 Each time a nozzle is checked, the measured amount of liquid retained by the nozzle including "zero."
- 12.8 For each nozzle that retained liquid, nozzle model and serial number.
- 12.9 Any violations.

13 CALCULATING RESULTS

(This section heading is not applicable to this procedure.)

14 REPORTING RESULTS

- 14.1 Report results to the station operator, manager, and/or owner.

- 14.2** As required by the local District or ARB, report results to the local District, ARB, and/or their designated representative.

15 ALTERNATIVE TEST PROCEDURES

Test procedures, other than specified above, shall only be used if prior written approval is obtained from the ARB Executive Officer. In order to secure the ARB Executive Officer's approval of an alternative test procedure, the applicant is responsible for demonstrating to the ARB Executive Officer's satisfaction that the alternative test procedure is equivalent to this test procedure.

- 15.1** Such approval shall be granted on a case-by-case basis only. Because of the evolving nature of technology and procedures for vapor recovery systems, such approval shall not be granted in subsequent cases without a new request for approval and a new demonstration of equivalency. Approvals may also require acceptance by local jurisdictions (local APCD or AQMD).
- 15.2** Documentation of any such approvals and demonstrations shall be maintained in the ARB Executive Officer's files and shall be made available upon request. The tester should also maintain a file of any such approvals and acceptances, and make them available, as necessary, in any affected test report.

16 REFERENCES

(This section is reserved for future specification.)

17 FIGURES

- 17.1** Figure 1- Example of a Field Data Sheet for Nozzle Liquid Retention.